Amendments to the Specification:

Please replace the paragraphs on page 2, line 10 -- page 3, line 9, with the following amended paragraphs:

However, as shown in Fig. 2, when the diameter R_{body} of the body part of the battery case 16 as well as the diameter R_{top} of a caulked portion thereof are formed to have the same size with a packing 23 provided between the battery case 16 and the electrode cap, pressure is not applied to the packing 23 equally, a gap is created between the battery case 16 and the electrode cap, this gap functions as a path for an electrolyte solution, and through this path, the electrolyte solution existing in the body part of the battery case will leak, which ~~gave~~ gives rise to a problem.

In addition, as shown in Fig. 5, when the tip portion of the battery case 16 is joined with ~~and~~ the outer periphery portion of the electrode cap by welding, and the diameter R_{body} of the body part of the battery case 16 and the diameter R_{top} of the caulked portion are formed to have the same size, adhesiveness of the battery case 16 and the outer periphery portion of the electrode cap 15A themselves are weak and the joining force thereof will be given only by welding. The battery formed by this method will not give rise to any problem in the case where it is used as a power source for electronic equipment such as communication ~~apparatus~~ apparatuses or computers, but it requires sufficient durability against vibrations taking place at the time of starting an engine or at the time of running the engine in the case where it is used as an engine driving or motor driving battery for an electric vehicle, etc., giving rise to a problem that it is difficult to hold long term sealing.

Please replace the paragraphs on page 4, line 23 -- page 6, line 2, with the following amended paragraphs:

In addition, still another objective is to provide a manufacturing method of the above-described lithium secondary battery in which manufacturing is simplified and improvement in productivity has been planned by making complicated operations such as joining ~~operation~~operations, etc., inside the narrow battery case unnecessary and by using only selected good battery elements for the subsequent steps.

~~Disclosure of~~ Summary of the Invention

According to the present invention, there is provided a lithium secondary battery including: a cylindrical battery case provided with electrode caps at both end portions thereof; an electrode body ~~integrated~~ impregnated with a nonaqueous electrolyte solution and contained in the battery case and including a positive electrode, a negative electrode, and a separator, the positive electrode and the negative electrode being wound or laminated through the separator; and moreover, an elastic body disposed between the above-described battery case and the above-described electrode caps with portions where the above-described battery case contacts the above-described elastic body being brought into press-contact to form a caulked portion to seal the above-described battery case; wherein, with R_{body} (mm) being a diameter of a body part of the above-described battery case, R_{top} (mm) being a diameter of the above described caulked portion, R_{body} and R_{top} fulfill the relationship of $R_{body} > R_{top}$. At this time, a battery case is preferably made of Al or Al alloy.

In a lithium secondary battery of the present invention, with ΔR(mm) being a difference between R_{body} (mm) and R_{top} (mm), ΔR preferably fulfills the relationship of $\Delta R \leq 5$(mm), and the R_{body} and the ΔR preferably fulfill the relationship of $(\Delta R/R_{body}) \times 100 \leq 10(\%)$.

Please replace the paragraphs on page 6, line 26 – page 8, line 3, with the following amended paragraphs:

In addition, according to the present invention, there is provided a lithium secondary battery, including: a cylindrical battery case provided at both end portions thereof with electrode caps having battery caps, internal terminals and external terminals; and an electrode body impregnated with a nonaqueous electrolyte solution and contained in the battery case and including a positive electrode, a negative electrode, and a separator, the positive electrode and the negative electrode plate being wound or laminated through the separator; portions where the above-described battery case is in contact with the above-described electrode caps being brought into press-contact to form a caulked portions to execute sealing; in which, with R_{body} (mm) being a diameter of a body part of the above-described battery case, R_{top} (mm) being a diameter of the above-described caulked portion, R_{body} and R_{top} fulfill the relationship of $R_{body} > R_{top}$; and tip portions of the above-described battery case and outer periphery portions of the above-described electrode caps are brought into joining by welding. At this time, a battery case is preferably made of Al or Al alloy, and the battery cap and the external terminal are preferably made of Al or Al alloy.

In a lithium secondary battery of the present invention, with ΔR(mm) being a difference between R_{body} (mm) and R_{top} (mm), ΔR preferably fulfills the relationship of $\Delta R \leq$

5(mm), and the R_{body} and the ΔR preferably fulfill the relationship of $(\Delta R/R_{body}) \times 100 \leq$ 10(%). In addition, as for the shape of the battery case, it is preferably shaped as a pipe. Moreover, the entire area of the tip portion of the battery case and the electrode cap are preferably joined by welding, and a squeezed portion is preferably formed in the very vicinity of the outer periphery portion of the electrode cap.

Please replace the paragraph on page 8, lines 11-26, with the following amended paragraph:

Moreover, according to the present invention, there is provided a manufacturing method of a lithium secondary battery, comprising the steps of: forming a battery element by joining respective electricity collection tabs provided in both ends of an internal electrode body which is structured by coiling a positive electrode and a negative electrode via a separator around the outer periphery of a winding core and respective internal terminal portions of two electrode caps together; inserting the battery element into a battery case with both ends being left open; joining respective both end portions of the above-described battery case with respective outer periphery portions of the above-described two electrode caps; and injecting electrolyte solution from an electrolyte solution injection port provided in at least one electrode cap, and sealing the above-described electrolyte solution injection port.

Please replace the paragraphs on page 9, lines 10-22, with the following amended paragraphs:

At the time of the caulking operation, it is preferable to arrange an elastic body between the battery case and the electrode cap, and the elastic body is preferably made of any of ethylene propylene rubber, polyethylene, polypropylene and fluororesin. At the time of the welding operation, a YAG ~~layer~~ laser is preferably used as an energy source. Moreover, as the battery case, it is preferable to use the one made of aluminum or aluminum alloy.

Brief Description of the Drawings

Figs. 1(a) and 1(b) ~~shows~~ show a battery ~~mode~~ made of a lithium secondary battery of the present invention. Fig. 1(a) is a sectional view, and Fig. 1(b) is a partially enlarged view of Fig. 1(a).

Please replace the Heading on page 11, line 11, with the following amended Heading:

~~Best Mode for Carrying Out~~ Detailed Description of the Invention

Please replace the paragraphs on page 13, line 1 -- page 14, line 3, with the following amended paragraphs:

In the first invention, with ΔR(mm) being a difference between R_{body}(mm) and R_{top}(mm), it is preferable that ΔR fulfills the relationship of $\Delta R \leq 5$(mm) while R_{body} and ΔR

fulfill the relationship of $(\Delta R/R_{body}) \times 100 \leq 10(\%)$. This comes from the later-described outcome of examples that caulking with a force not less than this gives rise to cracks in battery cases.

In addition, in the first invention, it is preferable that with the caulked portion, the deformation quantity in the press-contacting direction of the press-contacted elastic body preferably is larger than a spring-back quantity and that the press-contact force applied to the elastic body is to make not more than the press-contact force with an elasticity maintaining rate of the elastic body being not less than 95%. For this elastic body, a packing 23 corresponding with a shape of the electrode cap is used, as shown in Fig. 1(a), and the packing 23 will show elastic deformation with caulking. In the first invention, the internal electrode body 1 and the electrode cap are integrated by connection and are inserted into the battery case 16, with a battery case 16 being caulked to reach a certain point with the autograph, which position is treated as a reference, with displacement being monitored so that the load of press-contact is gradually made small, and the spring-back quantity refers to the displacement quantity from the reference position when the load has been completely released. At this time, if the deformation quantity in the direction of press-contact of the elastic body is larger than the spring-back quantity, no gap will take place even after caulking is finalized, and thereby, leakage of electrolyte solution is prevented.

Please replace the paragraphs on page 14, line 26 -- page 17, line 5, with the following amended paragraphs:

In addition, in the first invention, the electrode cap is preferably provided with an electrolyte solution injection port. The lithium secondary battery of the present invention can

be manufactured as follows for example. At first, the battery element compound of the battery cap and the internal electrode body to be integrated by tab press-attachment and welding is inserted into the battery case as a unitary structure. Then, squeezing processing as well as caulking processing is executed to close the battery. Subsequently, the internal electrode body is impregnated with the electrolyte solution from the electrolyte solution injection port provided in the battery cap, and then the injection port is capped~~, which is the manufacturing method~~. If the electrode cap is provided with an electrolyte solution injection port, the above-described manufacturing method can be adopted, and the electrolyte solution will be confined to the battery case body part, and together with deprivation of the above described caulked gap, possibility of leakage of electrolyte solution will almost disappear.

Next, a second invention will be described. The second invention ~~of the present invention~~ is a lithium secondary battery comprising an electrode body having a positive electrode, a negative electrode, and a separator, with the positive electrode and the negative electrode being wound or laminated via ~~a~~ the separator. ~~The~~ to an electrode body ~~which~~ is impregnated with a nonaqueous electrolyte solution ~~is~~ and contained in a cylindrical battery case having electrode caps at both the end portions, and the tip portion of the battery case and the outer periphery portion of the electrode caps are brought into joining by means of caulking, squeezing, and welding. Thus, the tip portion of the battery case as well as the outer periphery portion of the electrode cap are caulked so that the battery case is tightly sealed, squeezed so that the electrode cap is positioned and fixed, welded so that leakage of electrolyte solution can be restricted to an extreme degree.

Next, the third invention will be described. The third invention ~~in the present invention~~ is a lithium secondary battery comprising an electrode body having a positive electrode, a negative electrode, and a separator, with the positive electrode and the negative

electrode being wound or laminated via ~~a~~ the separator. The ~~to an~~ electrode body ~~which~~ is impregnated with a nonaqueous electrolyte solution, and contained in a cylindrical battery case comprising at both the end portions thereof electrode caps having a battery cap, an internal terminal and an external terminal. The ~~, the~~ battery ~~being~~ is sealed with a caulked portion formed by a portion brought into contact with the electrode cap of the battery case ~~is~~ and press-contacted, and being structured so that R_{body} and R_{top} fulfill the relationship of $R_{body} > R_{top}$, with R_{body}(mm) being a diameter of the body part of the battery case and R_{top}(mm) being a diameter of the caulked portion. The ~~, and thereby the~~ tip portion of the battery case and the outer periphery portion of the electrode cap are joined by welding processing. As shown in Fig. 4(a) and Fig. 4(b), within a range of intensity of a battery case 16, a positive electrode cap, a negative electrode cap, the diameter R_{body} of the body part of the battery case and the diameter R_{top} of the caulked portion are caulked intensively to fulfill the relationship of $R_{body} > R_{top}$ so that the caulked gap between the battery case 16 and the electrode cap is removed, and thereby welding will become possible to be executed stably and leakage of electrolyte solution can be controlled.

Please replace the paragraph on page 18, line 23 – page 19, line 2, with the following amended paragraph:

In the third invention, with ΔR(mm) being a difference between R_{body} (mm) and R_{top} (mm), ΔR preferably fulfills the relationship of $\Delta R \leq 5$(mm), and the R_{body} and the ΔR preferably fulfill the relationship of $(\Delta R/R_{body}) \times 100 \leq 10$(%). This comes from the later-described outcome of examples that caulking with force not less than this gives rise to cracks in battery cases.

Please replace the paragraph on page 20, lines 3-19, with the following amended paragraph:

Fig. 6(a) shows a welding method by passing a laser through the side face of the battery case 16 to reach the electrode cap, while Fig. 6(b) shows a welding method by irradiating ~~a~~ laser from an end surface side of the battery case 16. In this occasion, compared with the embodiment shown in Fig. 6(b), the embodiment shown in Fig. 6(a) is ~~little~~ not greatly influenced by eccentricity of the welded portion 26, but if there is a gap between the battery case 16 and the electrode cap, welding becomes insufficient[[~~welding~~]]. In addition, compared with the embodiment shown in Fig. 6(a), the embodiment shown in Fig. 6(b) is unlikely to be influenced by the above-described gap since the laser is irradiated to the abutment directly, but is apt to be influenced by eccentricity of the welded portion 26, and therefore the laser must be irradiated accurately onto the [[~~welded~~]] face to be welded.

Please replace Tables 2 and 3 on pages 40 and 41, with the following amended Tables 2 and 3:

[Table 2]

	OUTSIDE DIAMETER OF ELECTRODE CAP (mm)	$R_{body} - R_{top}$ (mm)	$\Delta R/R_{body}$ (%)	~~HE~~He LEAKAGE	ELECTROLYTE SOLUTION LEAKAGE
COMPARATIVE EXAMPLE 3	46	0	0	×*1	×
COMPARATIVE EXAMPLE 4	47	0	0	×*1	;
EXAMPLE 5	47	0.5	1	;	;
EXAMPLE 6	46	1.5	3	;	;
EXAMPLE 7	45	2.5	5	;	;
EXAMPLE 8	43	4.5	9	;	;
COMPARATIVE EXAMPLE 5	42	5.5	11	×*2	-*3

*1: INSUFFICIENT WELDING *2: CRACKS APPEARED IN ~~Al~~ THE Al PIPE

*3: DUE TO THE OCCURRENCE OF CRACKS IN ~~Al~~ THE Al PIPE, THE ELECTROLYTE SOLUTION LEAKAGE TEST WAS CANCELLED[[.]] (~~LEAKAGE~~ WILL TAKE PLACE FOR CERTAIN[[.]]).

[Table 3]

	OUTSIDE DIAMETER OF ELECTRODE CAP (mm)	$R_{body} - R_{top}$ (mm)	$\Delta R/R_{body}$ (%)	~~HE~~He LEAKAGE	ELECTROLYTE SOLUTION LEAKAGE
COMPARATIVE EXAMPLE 6	46	0	0	×*1	×
COMPARATIVE EXAMPLE 7	47	0	0	×*1	×
EXAMPLE 9	47	0.5	1	;	;
EXAMPLE 10	46	1.5	3	;	;
EXAMPLE 11	45	2.5	5	;	;
EXAMPLE 12	43	4.5	9	;	;
COMPARATIVE EXAMPLE 8	42	5.5	11	×*2	–*3

*1: INSUFFICIENT WELDING *2: CRACKS APPEARED IN ~~AL~~THE Al PIPE

*3: DUE TO THE OCCURRENCE OF CRACKS IN ~~AL~~ THE Al PIPE, THE ELECTROLYTE SOLUTION LEAKAGE TEST WAS CANCELLED[[.]] (LEAKAGE WILL TAKE PLACE FOR CERTAIN[[.]]).

Please replace the paragraph on page 41, lines 5-16, with the following amended paragraph:

As concerns assessment on He leakage and electrolyte solution leakage, for Examples and Comparative examples, 100 batteries were produced respectively, and presence or absence of electrolyte solution leakage and He leakage from the caulked portions where the battery case and the electrode cap were welded, a chasm in the aluminum pipe caulked portions, and presence or absence of cracks were observed to execute assessment. In Table 2 and Table 3, if any one of them fell into the state of the above-described insufficient performance, (X) was filled in, and if all the 100 units suffered from no He leakage, no liquid leakage or no cracks, (;) was filled in.